

WHAT IS CLAIMED IS:

AP
1. A semiconductor device manufacturing method for
forming first and second oxide films having different thicknesses
5 on a semiconductor, comprising steps of:

forming an oxidation resistance film on a second oxide
film formation area;

10 forming a first oxide film on a first oxide film formation
area;

15 removing the oxidation resistance film; and

forming a second oxide film on a second oxide film formation
area.

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2. A semiconductor device manufacturing method
according to claim 1,

wherein the first oxide film serves as a gate oxide film
of a first transistor, and the second oxide film serves as
a gate oxide film of a second transistor.

20 3. A semiconductor device manufacturing method
according to claim 2,

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wherein the first transistor is formed on the first oxide
film, and the second transistor is formed on the second oxide
film,

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wherein the first oxide film is formed by performing thermal oxidization by using the oxidation resistant film as a mask, wherein the second oxide film is formed by performing thermal oxidization.

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4. A semiconductor device manufacturing method for forming first and second transistors on semiconductor first and second gate oxide films having different thickness, comprising steps of:

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forming a device separation film on the semiconductor; forming an oxide film on a first transistor formation area and a second transistor formation area by performing thermal oxidization using the device separation film as a mask; forming an oxidation resistant film across the entire surface of the semiconductor;

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removing the oxidation resistant film on the first transistor formation area by using a photoresist film as a mask;

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removing the oxide film on the first transistor formation area;

forming a first oxide film by performing thermal oxidization by using the oxidation resistant film formed on the second transistor formation area as a mask;

removing the oxidation resistant film and the oxide film

on the second transistor formation area;

forming a second oxide film on the second transistor formation area by performing thermal oxidization.

5 5. A semiconductor device manufacturing method according to claim 4,

wherein a high-voltage MOS transistor is formed on the first gate oxide film thicker than the second gate oxide film,

wherein a normal-voltage MOS transistor is formed on the second gate oxide film.

10 6. A semiconductor device manufacturing method according to claim 4,

wherein the surface of the semiconductor is not exposed when the photoresist film is used as a mask.

15 7. A semiconductor device manufacturing method according to claim 4, wherein the step of forming a first transistor includes steps of:

20 forming an opposite conductive source/drain layer having a low concentration by an ion implantation of an opposite conductive impurity into the semiconductor of one conductive type;

 forming an opposite conductive source/drain layer having

a high concentration in the opposite conductive source/drain layer having the low concentration by the ion implantation of an opposite conductive impurity into the semiconductor;

5 forming a semiconductor layer of one conductive type that serves as a channel and is located between the opposite conductive source/drain layers; and

forming a first gate electrode on the semiconductor via
the first gate oxide film.

10 8. A semiconductor device manufacturing method according to claim 7,

wherein the opposite conductive source/drain layer having a low concentration is formed so that, at the least, the opposite conductive source/drain layer contacts the semiconductor layer that is formed below the gate electrode using an ion implantation method.

15 9. A semiconductor device manufacturing method according to claim 7,

20 wherein the opposite conductive source/drain layer having a low concentration is formed and extended at a small depth in the surface layer of the semiconductor, so that, at the least, the opposite conductive source/drain layer contacts the semiconductor layer that is formed below the gate electrode

using an ion implantation method.

10. A semiconductor device manufacturing method according to claim 4 further comprising a step of forming the
5 first transistor after forming the first gate oxide film, including steps of:

10 forming an opposite conductive source/drain layer having a low concentration by an ion implantation of an opposite conductive impurity into the semiconductor of one conductive type;

15 forming an opposite conductive source/drain layer having a high concentration in the opposite conductive source/drain layer having the low concentration by the ion implantation of an opposite conductive impurity into the semiconductor;

and

forming a first gate electrode on the semiconductor via the first gate oxide film.

11. A semiconductor device manufacturing method according to claim 4 further comprising a step of forming the
20 first transistor after forming the first gate oxide film, including steps of:

forming an first impurity layers having a low concentration by an ion implantation of an opposite conductive impurity into

two portions of the semiconductor of one conductive type;
forming a second impurity layer having a low concentration
by an ion implantation of an opposite conductive impurity to
connect the first opposite conductive impurity layers;

5 forming a third impurity layer having a high concentration
by an ion implantation of an opposite conductive impurity in
the first opposite conductive impurity layer;

10 forming a fourth impurity layer by an ion implantation
of an one conductive impurity to divide the second impurity
layer;

15 forming a first gate electrode on the semiconductor
including the fourth impurity layer via the first gate oxide
film.

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Cult. 12. A semiconductor manufacturing method according to
claim 11,

wherein the second impurity layer is thinner than the
first impurity layer.